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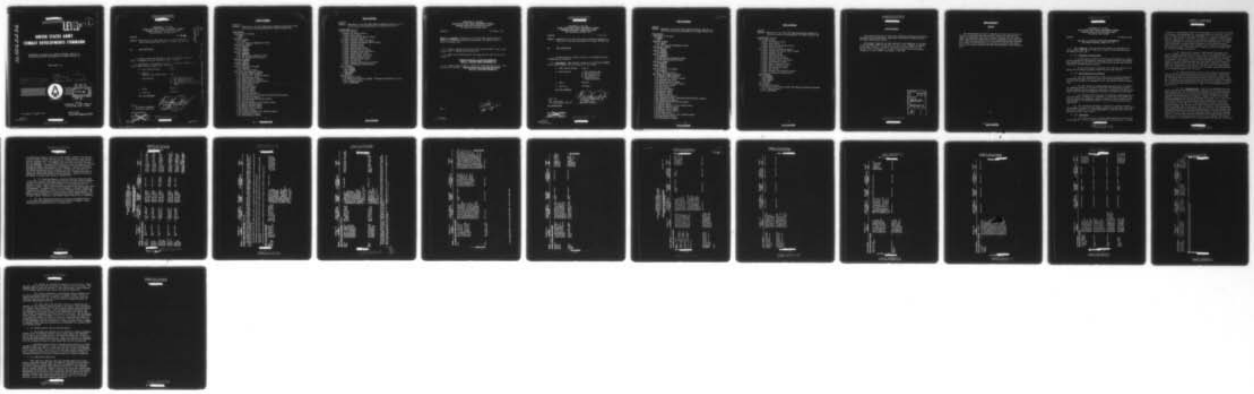

LEVEL II

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UNITED STATES ARMY
COMBAT DEVELOPMENTS COMMAND

DEPARTMENT OF THE ARMY (DA) APPROVED MATERIEL ANALYSIS OF COLLECTIVE PROTECTION REQUIREMENTS FOR COMBAT VEHICLES (U)

USACDCCBRSS 4-65

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U.S. Army Combat Developments Command
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CAGCB-SC

21 JAN 1966

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1. Inclosed errata and addendum to materiel analysis, subject as above, is forwarded for your information and retention.

2. Correlation. This materiel action is identified as USACDC Action Control Number 4656 and supports the following:

a.	Army Concept Program	Army 75
b.	Army 75 USACDC Action Control Number	3189
c.	Army Missions	1: High Intensity Warfare 2: Mid Intensity Warfare 3: Low Intensity Warfare Type I 7: Complementing of Allied Land Power
d.	Phase	Materiel
e.	Function	Firepower

FOR THE COMMANDER:

WILLIAM J. HARRINGTON, JR.
Lt Colonel, CmlC
Executive Officer

2 Incl
1. (U) Errata & Addendum
2. (C) Table supplement

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DEPARTMENT OF THE ARMY
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND
CHEMICAL-BIOLOGICAL-RADIOLOGICAL AGENCY
Fort McClellan, Alabama 36201

CAGCB-SC 19 January 1966

ERRATA and ADDENDUM to Department of the Army (DA) Approved Materiel Analysis of Collective Protection Requirements for Combat Vehicles, dated 19 November 1965.

1. Page 8, footnote marked with double asterisk (**); change "M18A1 detector kit" to "AN-M15 A1A detector kit".

2. Make the following pen and ink change in the title of the table on page 6:

CHEMICAL-BIOLOGICAL COLLECTIVE PROTECTION
PART I: VEHICLES UNDER DEVELOPMENT (U)

3. Between pages 10 and 11, insert the table included in this change (Inclosure 2) entitled, "CHEMICAL-BIOLOGICAL COLLECTIVE PROTECTION
PART II: VANS AND SHELTERS (U)"

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CAGCB-RC 19 NOV 1965

SUBJECT: Department of the Army (DA) Approved Materiel Analysis of Collective Protection Requirements for Combat Vehicles (U)

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b.	Army Missions	1: High Intensity War 2: Mid Intensity War 3: Low Intensity War 7: Complementing of Allied Land Power
c.	Phase	Materiel
d.	Functions	Firepower

FOR THE COMMANDER:

WILLIAM J. HARRINGTON, JR.
Lt Colonel, CmlC
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12 CO Edgewood Arsenal
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ACKNOWLEDGEMENT

This materiel analysis is based upon information gathered and analysis performed by the United States Army Combat Developments Command Chemical-Biological-Radiological Agency.

The materiel analysis has been approved by the Department of the Army by 3rd Ind CRD/G, OCRD, 24 Aug 1965, to basic letter, CDCMR-U, Hq USACDC, 27 Aug 1964, subject: Collective Protection for Combat Vehicles (U). Distribution is authorized by the United States Army Combat Developments Command by 4th Ind, CDCMR-U, Hq USACDC, 3 Sep 1965.

SUMMARY

The requirements for positive pressure collective protection for vehicles in mid-intensity/high-intensity warfare are analyzed with respect to desorption time, heat build-up, isolation from the battlefield, entry and exit requirements, power requirements, and weight and cube. Specific requirements for both protection and warning equipment for vehicles under development are presented in tabular form along with a list of these vehicles and brief descriptions of their probable uses.

[redacted]

DEPARTMENT OF THE ARMY
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND
CHEMICAL-BIOLOGICAL-RADIOLOGICAL AGENCY
Fort McClellan, Alabama

CAGCB-RC 17 November 1965

ANALYSIS OF COLLECTIVE PROTECTION REQUIREMENTS FOR COMBAT VEHICLES, CBRSS 4-65 (U)

1. (U) Authority: This analysis was prepared in compliance with letter, CRD/V, OCRD, Hq DA, 27 May 1964, subject: Collective Protection for Combat Vehicles (U).

2. (U) Statement of the Problem:

a. To analyze the collective protection requirements for combat vehicles planned for development; examining concepts of use and employment; type, degree and location of collective protection required; and type and location of CB alarm systems required.

b. To set forth specific guidance as to kind and location of CB protection and warning equipment desired for each type vehicle.

3. (C) Facts Bearing on the Problem:

a. (U) The stated position of DA is that collective protection is required for those vehicles in which functions are performed; those vehicles used primarily as transporters will not require collective protection.

b. (U) The currently standard M13A1-type protection is adequate for permanent members of the vehicle crew such as drivers and assistant drivers; however, positive-pressure protection is desirable for those crews whose activities would be hampered by wearing of the M14 or the M17 mask.

c. (C) Present state-of-the-art of individual decontamination is such that there is virtually no likelihood of producing within a QMR time frame an instant decontaminant capable of causing a toxic chemical or biological agent to be ineffective within a five to ten minute period after application.

d. (U) CB warning equipment is essential to inform occupants of the presence or absence of toxic agents inside the vehicle and to give warning of toxic agents in the outside atmosphere to those who must leave the protection of the combat vehicle.

4. (C) Discussion:

a. (C) Within the past two years added emphasis has been placed on the need for collective protection for mobile field shelters. This was

[redacted]

fostered to a considerable extent by the development of a concept envisioning a continuous toxic atmosphere or a continuous threat of CB attack, either of which ultimately leads to the same requirement -- a collective protective shelter. This shelter is necessary to allow the occupants to perform duties which are impossible to perform in a contaminated atmosphere (or are inefficiently performed) or to allow withdrawal by the individual from a contaminated environment to obtain relief and respite and to perform personal functions such as shaving, eating, smoking, etc. To the above requirements may be added another: the protection of complex electronic equipment from the effects of antimaterial agents.

b. (U) To provide the degree of C&B protection required, the positive pressure concept was developed. This, in its simplest form, is simply pumping relatively airtight shelters full of filtered air until overpressure causes air to flow from the shelter thus preventing the entrance of any agent. The pressure of the enclosed air need not be great -- three-tenths of an inch of water pressure may effectively block the entrance of agents, although several times that pressure may be required to override other air requirements of the shelter. In other words, air under pressure leaks out through crevices and leaks in the structure, preventing entrance of air carrying unwanted toxic CB agents.

c. (C) Positive pressure can be the most effective system; however, there are disadvantages that must also be considered. These disadvantages are primarily categorized as the "price which must be paid" for the convenience and secure protection afforded by positive pressure. They may be overcome and in some applications may require only slight consideration, whereas in other applications they may be of such weight as to require use of some other form of protection. Some of the disadvantages are discussed below.

(1) (C) Desorption time. Lack of a decontaminant that can rapidly and effectively decontaminate an individual or the equipment which must accompany him into a CB shelter has required the wearing of complete individual protection within the positive pressure system until the contaminant has been degraded or dissipated. During the CDEC trials (ROAD Battalion Operations in a Toxic Environment (U), Volume 2 of 3 - Toxic-free Shelter Experiment) this desorption time was assumed to be one hour, on the basis of the most recent laboratory advice available at that time. Thus, during a total stay time of one hour and 35 minutes in a positive pressure shelter, one hour was spent before removing the protective mask. This was repeated upon every re-entry into the vehicle. This disadvantage was of major interest in considering application of positive pressure when repeated re-entries were necessary and particularly in those vehicles that could afford the luxury of an air-lock entry system. The recent standardization of the M-13 Individual Decontamination and Reimpregnation Kit provides a means of reducing desorption time to a few minutes. The current development of an overgarment using a polyurethane foam-charcoal combination

is expected to further reduce the stay time to a 30 second to 90 second period. This reduction in time will entail removal of the garment and decontamination of footwear; however, these procedures can be done simply and rapidly. The garment is designed for simple and rapid donning and doffing; decontamination of footwear can be accomplished in a matter of seconds by use of the M-13 Decontamination and Impregnation Kit or a shuffle box containing a dry bleach. The resultant reduction in time places the desorption time within tolerable limits and increases the applicability of collective protection to the command post or other like activity having a high entry-reentry rate.

(2) (U) Heat Build-up. Application of positive pressure collective protection to a shelter requires that the shelter be sealed as much as possible to restrict airflow (thus reducing power requirements to supply filtered air) and to allow a positive pressure to be built up and maintained. This restricts the ventilation rate, thus preventing the free transmission of heat and moisture to the ambient atmosphere, and may result in an intolerable atmosphere within the shelter. To offset this intolerable atmosphere, environmental controls (cooling and dehumidifying equipment) must be applied and an upward spiral is initiated, for, as ambient air must be supplied to maintain the positive pressure, so must additional environmental control equipment be added to filter and cool the additional air. Where weight and cube of additional equipment are critical, this additional equipment, though contributing to better performance, may be an unsupportable luxury. Where importance of the functions performed within the shelter are sufficiently great, what has been a luxury may become a necessity.

(3) (U) Isolation from the Battlefield. Positive pressure collective protection is essentially an encapsulation of individuals during the time they are within its protection. Such encapsulation may be beneficial to the function being performed when that function is performed wholly within the shelter and is a primary function incident to the battlefield action. In most instances, however, this encapsulation and its accompanying isolation from the battlefield will be restrictive or may place the individual in a position to be completely ineffective in carrying out his assigned mission. Therefore, when transportation can be performed with individuals in a ready position (equipped with the individual protection they must wear when dismounted), protected by an overhead cover from chemical spray attacks, and protected from small arms fire and shell fragments, further protection and resultant isolation is neither required nor desirable.

(4) (C) Entry and Exit Requirements. No rapid acting, effective decontaminant to reduce contamination on an individual to a safe respiratory level is or will be available within a QMR time frame. Therefore, considerable time must be spent in reducing the contamination to a safe level. This desorption time with concurrent wearing of the mask can be tolerated when necessary as in the operation of a combat rest and relief shelter where part of the rest time can be performed in a mask. The desorption time required for numerous or frequent reentries into a combat troop carrier will render any positive pressure protection in such a carrier of little value most of the time to the transported infantrymen. If it were

possible for infantrymen to do all fighting without dismounting, positive pressure protection would be of great benefit; however, infantrymen must dismount to engage other infantrymen in combat. Upon reentry into the vehicle, full individual protection must continue to be worn until the interior of the vehicle is purged of contamination.

(5) (U) Power Requirements. As indicated in the discussion of heat buildup, power requirements escalate when filtration and environmental control equipment required for positive pressure protection are installed. This may not be a significant disadvantage when the area to be pressurized is small and the power supply ample; however, when the load placed upon the system is large either by area and occupancy or by temperature extremes, the additional power requirement may be excessive or even exorbitant in relation to the available power supply. For example, what may not be a disadvantage in the main battle tank constitutes an excessive requirement in a combat personnel carrier.

(6) (U) Weight and Cube. Environment control and air filtration equipment weight and space present problems even though the systems have been miniaturized and integrated into ventilating and heating systems now existent in the vehicles being pressurized. The space problem becomes critical in many vehicles since the equipment must be housed within the combat vehicle to receive protection against shell fire. Space in many vehicles is already at a premium. Weight, too, becomes critical, particularly when positive pressure equipment and power requirements escalate and the power available has been designed to satisfy only the essential power requirements necessary for operation of the unpressurized vehicle.

d. (U) Factors which may override the disadvantages listed above are as follows:

(1) Requirement for an uncontaminated atmosphere is essential to the performance of a function within the combat vehicle.

(2) The task performed by the combat vehicle and its occupants is of utmost importance and can be done when isolated from the battlefield.

(3) The combat vehicle is suitable to support or sustain the weight, cube, and power requirements of the positive pressure system.

(4) Assigned functions of the shelter and its occupants permit scheduling entries or operating with a minimum number of entries.

e. (U) The factors listed above may dictate the requirement of positive pressure collective protection as in the case of a combat vehicle used as a battalion aid station where treatment of wounds must be performed in an uncontaminated atmosphere, or in the case of a vehicle or van which houses complex electronic equipment that may be very vulnerable to attack

by antimaterial agents or even those toxic chemical agents which are corrosive in action. Other vehicles, such as bridge launchers, may require positive pressure due to the vulnerability to attack of the areas in which they are employed, e.g., a bridgehead, and the haste with which the task must be performed. In general these vehicles do have the capability of supporting the weight, cube and power requirements of the positive pressure systems, and reentry requirements are at a minimum. Vehicles used as rest and relief shelters may have a scheduled entry-reentry list which can reduce the limitations imposed by desorption time. Command posts and communications centers may require positive pressure to maintain efficiency and surety of control and clarity of communication.

f. (C) Positive pressure collective protection frees the users of the need to utilize individual protection, but the very freedom afforded increases the need of a CB agent warning device to warn the users of the presence of toxic CB agents and conversely to inform the users of the absence of agents. This is particularly important in the absence of a rapid decontaminant. A warning device is also required to transmit information concerning the presence or absence of toxic CB agents in the outside atmosphere to allow individuals to take necessary precautionary measures. The present state-of-the-art of CB warning devices cannot produce the desired universal device; therefore, only chemical agent alarms will be considered.

5. (U) The foregoing rationale has been used in preparing CB collective protection requirements for vehicles under development. These requirements are presented in the following tables.

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UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND
CHEMICAL-BIOLOGICAL-RADIOLOGICAL AGENCY
Fort McClellan, Alabama

CHEMICAL-BIOLOGICAL COLLECTIVE PROTECTION
Part I - [redacted] VEHICLES UNDER DEVELOPMENT (U)

VEHICLE	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
ENGINEER VEHICLES UNDER DEVELOPMENT					
Combat Engineer Vehicle-70	See continuation sheet	1. Filter, M13A1 type 2. Crew compartment only.	Automatic chemical alarm with audible tones and visual light signals.	Inside vehicle	Inside vehicle with internal and external detection device. 1 per vehicle.
Armored Vehicle Launched Bridge	See continuation sheet	1. Filter M13A1 type 2. Crew compartment only.	Automatic chemical alarm with audible tones and visual light signals.	Inside vehicle	Inside vehicle with internal and external detection device. 1 per vehicle.
Carrier, Amphibious Assault, Personnel and Cargo (CAAPC)	See continuation sheet	1. Positive pressure 2. Operating crew compartments only.	Automatic chemical alarm with audible tones and visual light signals.	Inside vehicle crew compartment	Inside crew compartment with internal and external detection devices. 1 per 10 vehicles.
Ballastable Tractor (light and medium)	See continuation sheet	1. Positive pressure 2. Operating crew compartment only.	Automatic chemical alarm with audible tones and visual light signals.	Inside vehicle crew compartment	Inside crew compartment with internal and external detection device. 1 per 3 vehicles.
Medium Assault Vehicular Launched Bridge	See continuation sheet	1. Positive pressure 2. Crew compartment only.	Automatic chemical alarm with audible tones and visual light signals.	Inside vehicle	Inside crew compartment with internal and external detection device. 1 per vehicle.

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VEHICLE	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM

ENGINEER VEHICLES UNDER DEVELOPMENT (continued)

The following vehicles are either in their final developmental stage or type classified for "limited production", and incorporation of chemical-biological collective protection equipment must be limited to current standard equipment and methods. Redesign of the following vehicles, to include other than current standard chemical-biological protection equipment, will significantly increase costs and delay final type classification.

Universal Engineer Tractor (prototypes for testing to be delivered for engineering test/service test first and second quarter FY 65)

Combat Engineer Vehicle (engineering test/service test complete; type classified "limited production")

Armored Vehicle Launched Bridge (mounted on M60 tank chassis) (engineering test/service test complete; type classified "limited production")

Mobile Floating Assault Bridge/Ferry (engineering test/service test complete; type classified "limited production")

ARMOR VEHICLES UNDER DEVELOPMENT

Main Battle Tank (MBT) 1968-1970	Pertinent excerpts from the proposed draft QMR are provided on the attached sheet.	Type: An environmental control positive pressure system to control temperature, humidity, dust and NBC agents.	1. Simple device to automatically detect contamination in crew compartment (C essential, B desired) and sound alarm in presence of contaminant - 1 mounted on each vehicle. 2. Automatic chemical alarm to detect external contamination (C essential, B desired) - no more than 1 per platoon. 3. AN-M15 A1A detector kit - 1 per vehicle.	1. Inside vehicle	1. Internal detection device inside vehicle. 2. Outside detection device inside vehicle with outside probe.

VEHICLE	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
ARMOR VEHICLES UNDER DEVELOPMENT (continued)					
Armored Scout Vehicle	Successor vehicle to the M114. Organic vehicle of scout sections in armored cavalry and reconnaissance platoons. Used to execute all reconnaissance and security tasks.	None. Protection is to be provided by individual masks (M25A1) (Preferred over M17).	1. A simple device to automatically detect C essential, B desired and sound alarm. The device must be in the form of a kit to be carried as OVE in selected vehicles. 2. A tactical survey meter and vehicular radiac system will be placed on selected vehicles. 3. Detector kit AN-M15A1A on selected vehicles.	Not applicable	Inside the vehicle with a means for external probe when desired.
AR/AAV, XM551	Main assault weapon of the combined arms team performing reconnaissance and security missions.	Type: M13A1 filter unit - gas particulate Degree: To 4-man crew	*1. Simple device to automatically detect contaminating agent (C essential, B desired) inside and/or outside vehicle. **2. Use of AN-M15 A1A detector kit.	Inside vehicle	Inside vehicle with inside and/or outside probe when desired.

* When this vehicle is employed in the armored cavalry and reconnaissance platoon roles, the warning device will be carried by other vehicles accompanying this vehicle. When employed in airborne tank units, provision must be made for installation of a simple alarm to automatically detect C essential, B desired, one per platoon.

** When this vehicle is employed in the airborne tank units, the ~~M18A1 detector kit~~ will be provided on the vehicles equipped with the alarm system; otherwise, none will be provided. AN-M15 A1A detector kit.

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VEHICLE	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
AIR DEFENSE VEHICLES UNDER DEVELOPMENT					
XM551	Probable uses* (AADS-70): a. Btry cmd & control vehicle; b. Maintenance spt vehicle. Possible uses* (AADS-70): Radar vehicles must operate under all battlefield conditions.	Type: Positive pressure (Positive pressure device will be combined with the air conditioning system to provide either continuous or automatic CBR protection). Degree: Entire interior of operating crew compartment to include electronic, mechanical and hydraulic cabinets with chassis or component parts normally repairable or replaceable from within the crew compartment.	Automatic chemical alarms	As the AADS-70 system is still in the feasibility stage, system configuration is not definite; however, the collective protection equipment will most probably be attached externally to the operating crew compartment of the vehicle.	The alarm will most probably be attached externally to the crew compartment of the vehicle. If a small compact but efficient alarm exists within the time frame of the AADS-70 system and if it proves economically feasible, it would probably prove beneficial to provide each vehicle with an alarm. If the above conditions cannot be met, a tentative BOI would be 2 alarms per AADS-70 firing battery. (Final system configuration will determine exact requirements.)
XM491	Possible use: (AADS-70): Radar vehicle	Same as above	Same as above	Same as above	Same as above

* See DA approved QMR for the Army Air Defense System - 1970's (U), 17 April 1963.

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VEHICLE	CONCEPT OF USE AND EMPLOYMENT	TYPE AND DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT REQUIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
INFANTRY VEHICLES UNDER DEVELOPMENT					
Mechanized Infantry Combat Vehicle MICV-70	a. Used as mechanized infantry combat vehicle for both mounted and dismounted combat. b. Used as collective protection combat shelters for mechanized infantry.	Positive pressure collective protection for entire interior to provide a single vehicle which may be used for a fighting vehicle yet provide the necessary protection for use as a rest and relief station.	Automatic chemical alarm	Inside vehicle	Inside the vehicle to monitor atmosphere inside and outside the vehicle. 1 per vehicle.
Armored Command Post, M577	Used as mobile command post and fire control center.	Positive pressure collective protection for entire interior of vehicle.	Automatic chemical alarm	Inside vehicle	Inside the vehicle to monitor atmosphere inside and outside the vehicle. 1 per vehicle.

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DEPARTMENT OF THE ARMY
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND
CHEMICAL-BIOLOGICAL-RADIOLOGICAL AGENCY
Fort McClellan, Alabama

CHEMICAL-BIOLOGICAL COLLECTIVE PROTECTION
PART II: VANS AND SHELTERS (U)

19 January 1966

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIP.	LOCATION OF ALARM
AIR DEFENSE VANS & SHELTERS					
Model FSN AN/TSW-2 1430-624-4582 Line item no. 4-16560-01 AN/TSW-2-XO-2 1430-708-2896 Line item no. 4-16560-02 AN/TSW-2-XO-3 1430-714-3316 Line item no. 4-16560-03 TOE 44-237D	Guided Missile Battery Control Central is a shelter used with the Hawk Guided Missile System. It shelters the tactical control equipment necessary to operate the Hawk battery. A similar shelter is being designed for SP Hawk.	Positive pressure (positive pressure device will be combined with the air-conditioning system to provide either continuous or automatic CB protection). Degree: Entire interior of operating crew compartment to include electronic, mechanical and hydraulic cabinets with chassis or component parts normally repairable or replaceable from within the shelter.	Automatic chemical alarm.	Outside shelter.	Inside shelter to monitor the atmosphere inside & outside the shelter. 1 per shelter.
Tracking Station Guided Missile Trailer Mounted AN/MPA-5A/Nike Hercules Improved TOE 44-537D, line item 456847	The tracking station guided missile trailer mounted AN/MPA-5A/Nike Hercules Improved is the radar control center of a Nike Hercules battery.	Same as above.	Same as above.	Same as above.	Same as above.

Incl 2

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIP.	LOCATION OF ALARM
Director Station Guided Missile Trailer Mounted AN/MSA-19A w/e TOE 44-537D Line Item 412471	The Director Station Guided Missile Trailer Mounted AN/MSA-19A w/e is the tactical command and control station in a Nike Hercules battery.	Same as above.	Same as above.	Same as above.	Same as above.
Launching Control Group Guided Missile Trailer Mounted AN/MSW-4 Nike Hercules TOE 44-537D Line Item 421910	The Launching Control Group Guided Missile Trailer Mounted AN/MSW-4 Nike Hercules is the launcher platoon tactical control center of the Nike Hercules battery.	Same as above.	Same as above.	Same as above.	Same as above.

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
ARMY AVIATION VANS & SHELTERS					
Flight operation center van, AN/GSQ86	a. Used to accomplish planning, coordination, and communications necessary for the Army air traffic regulation system. b. Employed on airfields in corps and army area and elsewhere when required.	Type: Positive pressure (Positive pressure filtration system will be combined with the air-conditioning system to provide continuous CB protection.) Degree: Entire interior of operating crew compartment to include electronic components essential to the operation.	Automatic chemical.	Outside van.	Inside van to monitor the atmosphere inside and outside the Van. 1 per Van.
Flight coordination center van, AN/GSQ85	a. Used in the Army air traffic regulation system to provide an extension of the FOC communications. b. Usually employed on airfields in a division area.	Same as above.	Same as above.	Same as above.	Same as above.

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
ARMY AVIATION VANS & SHELTERS (continued)					
Air terminal control facility AN/GSQ87	a. Used to provide a compact air transportable unit containing all equipment necessary to control the landing and takeoff of Army aircraft arriving and departing tactical Army airfield during in[illegible]mental flight rul[illegible]FR low visibility co[illegible]s) and provide suitab[illegible] space for air traff[illegible] trol personnel. b. Employed on divis[illegible] corps and army airfield used for IFR tr[illegible]fic and by Special Warfare aviation units.	Same as above.	Same as above.	Same as above.	Same as above.

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
ARTILLERY VANS & SHELTERS					
Radio Terminal Set (RTS), AN/TRC-80 (Pershing Weapon System)	Vehicle in which personnel provide system communication with higher headquarters and intercommunications between components of the missile system.	Positive Pressure.	Automatic Chemical Alarm.	Inside RTS.	Inside RTS to monitor the atmosphere inside and outside RTS. 1 per RTS.
Electrical Shelter S-280	Shelter houses radios with which crewman maintains communications with higher headquarters and interbattalion communications. Shelter utilizes 2-1/2 T truck.	Positive Pressure.	Automatic Chemical.	Inside shelter.	As above.
Electrical Shelter S-318	Shelter houses radios, message centers and battalion and battery switchboards with which crewmen maintain interbattalion communications. Shelter utilizes 3/4 Ton Truck.	Positive Pressure.	Automatic Chemical.	Inside shelter.	As above.
Truck, Van-Shop 2-1/2 T, 6x6 (M109)	Fire direction center vehicle and area for crewmen to repair or replace components as required in the field.	Positive Pressure.	Automatic Chemical Alarm.	Inside Van-Shop.	Inside van-shop to monitor the atmosphere inside and outside van-shop. 1 per van-shop vehicle.

VANS OR SHELTERS	CONCEPT OF USE AND EMPLOYMENT	TYPE & DEGREE OF COLLECTIVE PROTECTION REQUIRED	TYPE WARNING EQUIPMENT DESIRED	LOCATION OF COLLECTIVE PROTECTION EQUIPMENT	LOCATION OF ALARM
Tactical Imagery Interpretation Facility (AN/TSQ-43)	Used for interpretation of imagery obtained by surveillance aircraft.	Positive pressure collective protection for entire interior of van.	Automatic chemical alarm with audible tones and visual light signals.	Outside van.	Inside van to monitor atmosphere inside and outside the van. 1 per van.

Operational characteristics required for vans can be satisfied by Department of the Army approved Small Development Requirement (SDR) for Collective Protector for Truck Van, Command Post Vehicle (U) (CSCRD-65).

[redacted]

CONTINUATION SHEET

1. (C) Combat Engineer Vehicle-70.

a. The primary role of this vehicle is combat support. The Combat Engineer Vehicle provides a mobile and maneuverable armored vehicle for combat engineer support. The armor protection of the Combat Engineer Vehicle permits its employment well forward and enhances the accomplishment of engineer tasks.

b. During both offensive and defensive operations, the Combat Engineer Vehicle may accomplish the following tasks while under fire.

(1) Assault of obstacles with its demolition charge projector to breach tank walls, tank ditches and other obstacles.

(2) Assault of enemy pillboxes with the same gun.

(3) Constructing entrances, by-passes, lanes and exits in obstacle areas with its dozer blade.

(4) Constructing fords.

(5) Clearing rubble in cities and on routes of communications.

(6) Utilizing its boom and winch to clear routes or to assist in recovery operations.

(7) Improvement of security of US forces by constructing and improving barrier systems.

2. (C) Armored Vehicle Launched Bridge-70.

a. The Armored Vehicle Launched Bridge, which can be rapidly emplaced over gaps up to possibly 100 feet, provides the crossing means for assault armor under small arms fire and air fragmentation bursts. The bridge on its transporting launcher is a self-contained and operational unit which accompanies the forward elements of an advancing combat force.

b. This bridge will be used in the combat area to provide assaulting elements a rapidly emplaced armor protected gap crossing means and will be replaced by standard fixed or floating line of communication bridging as soon as the tactical situation permits.

c. In a multiple crossing, leap-frog type operation, the rearmost emplaced bridge will be picked up on the far shore of the crossing by a designated launcher and moved forward to the advancing element over like-emplaced Armored Vehicle Launched Bridges.

[redacted]

d. In large-scale operations where division bridge emplacements are anticipated to be too numerous for the "leap-frog" type of operation to be wholly adequate, reinforcement of the Armored Vehicle Launched Bridge will be made from corps bridge units.

3. (C) Carrier, Amphibian Assault, Personnel and Cargo.

a. The Carrier, Amphibian Assault, Personnel and Cargo, will be used primarily to transport amphibious assault troops as they move and fight with other assault elements. In such a role, this vehicle must be equipped with weaponry capable of destroying obstacles, breaching barriers and automatic fires. It should be lightly armored to afford protection from radiation, conventional shell fragments and small arms fire. During combat support operations, the Carrier, Amphibian Assault, Personnel and Cargo, may be used to transport engineer assault and supporting elements from ship to shore or shore to shore, their weaponry, equipment, and combat support material in support of an assault landing with speed equalling or surpassing assaulting forces.

b. After this carrier has been converted from a personnel carrier to a cargo carrier, the cargo carrier can be used to transport combat cargo, barrier and obstacle material direct to assaulting forces on the beach or inland as the assault progresses. Additionally, this vehicle can be used as combat cargo carrier for units charged with beach security and as a casualty evacuation transporter for medical units on the back-haul. It also will be capable of command communications relay stations and beach clearance operations.

4. (C) Ballastable Tractor.

a. The Ballastable Tractor, Medium, as the primary vehicle of the combat engineer battalion, within divisional and nondivisional combat engineer battalions, will be used primarily as an earthmoving tool for the engineer squad. It must be lightly armored and provide a mode of transportation for the engineer squad superior to the M113 Armored Personnel Carrier.

b. The Ballastable Tractor, Medium, will be used by engineer troops as indicated below:

(1) Transporting the engineer squad, its hand tools, its weapons, its personal effects, and the supplies needed for the squad mission over the same routes and at speeds compatible with the supported combat elements.

(2) The tractor must be rapidly convertible from the engineer squad carrier to a ballasted bulldozer. As such it will be used in all manners of dozing tasks, such as opening hasty roads, clearing bypasses to obstacles, constructing fords, clearing and constructing hasty air landing facilities, breaching obstacles, and creating gun emplacements.

(3) Hauling the construction supplies to the work site. Hauling spoil away from the site and moving fill earth or rock to the site. The numerous types of loads and materiel of this type require a cargo platform, a self-loading capability, and a power load ejection capability.

(4) With an attachment, the Ballastable Tractor, Medium, will be used in winching operations in support of engineer troops involved in construction tasks as well as in recovery operations; hoisting loads into itself or other vehicles, and can also be used as a ripper and rooter to facilitate earthmoving operations.

(5) This vehicle may possibly be used as a transporter and launcher for the vehicular launched bridge of the period. This utilization will require some alteration of the basic chassis superstructure and hydraulic systems to erect the bridge. This requirement may be generated from the development of the small, light, highly maneuverable main battle tank which cannot counterbalance the bridge during its erection. The Ballastable Tractor, Medium, itself envisaged to be a 10-15 ton vehicle, and ballastable to 25 tons will probably be the only vehicle on the battlefield capable of counterbalancing the bridge during its erection. When the tractor is used for this purpose, it must be considered as a special purpose vehicle assigned to engineer combat battalions possessing the requirement for a mobile vehicular launched bridge.

5. (C) Medium Assault Vehicle Launched Bridge.

a. The bridge with launcher will be employed to support mechanized infantry units in attacking opposing forces across terrain now impassable due to lack of gap crossing devices. The proposed bridge will be used to provide necessary crossing capability for class 15-20 vehicles, to negotiate both natural and man-made canal networks, swamps and other natural obstacles of up to 18 meters in width in combat operations over wet and dry gaps.

b. The Medium Assault Vehicle Launched Bridge mounted on a standard XM551 AR/AAV will enable a bridge to be emplaced without exposing crew members to small arms fire in a time frame that will not halt the momentum of the attacking force. The item will be used where terrain conditions dictate a bridge is required to accomplish a successful assault crossing of mechanized infantry in daylight or darkness and in all weather conditions.

6. (C) Main Battle Tank 68-70.

This tank will constitute the main striking weapon in the integrated combat arms fighting team. This tank will provide mobile protected firepower which will permit attacking forces to penetrate the enemy position and to operate against deep, decisive objectives. It will provide mobile, offense support for infantry forces in the attack and counterattack, and add antitank protection, depth, resiliency, and mobility to the defense. Improvements in survivability over the M60 must provide improved ballistic, nuclear, chemical, and radiological protection for the tank and the crew. Operation of this tank during extended periods of combat up to 48 hours duration, without logistical support, is required.